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(19)(CA) **APPLICATION FOR CANADIAN PATENT** (12)

5,093,404

(54) Mould for Concrete Block Moulding Machines

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(57) 16 Claims

90° 180°

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TEXT TRANSLATION

"Mold for concrete-block molding machines"

Description:

The invention relates to a mold for concrete-block molding machines, with a molding frame having at least one chamber which is open at the top and bottom and which is bounded by chamber walls.

A mold of this type is known from EP-A2 0,318,708. In order to carry out the molding operation, the mold is placed onto a vibrating table and filled with a relatively dry concrete mixture. A ram fitting exactly into the chamber then plunges from above into the chamber, and the load of the ram can likewise be provided with a vibrator. After compaction, the moldings, which remain adhering in the chamber even after the removal of the vibrating table, are deposited onto a conveying means or on moldings produced in a preceding operation, after dry sand has been scattered on as a separating agent (multi-layer finisher). For this purpose, the molding frame moves upwards, so that the ram, initially remaining in its position, presses the molding out of the chamber.

However, there are also concrete moldings which, as a result of their high weight and as a result of reduced contact with the chamber walls, would fall out of the chamber while the mold is being raised. One example of this is curbstones which have a rounding and an oblique face which are shaped by means of a special ram (blade). The oblique face does not contribute to adhesion in the mold.

Other concrete bodies acquire a special design of their lower surface by means of a so-called undersleeve. By this is meant a mold part which is inserted into the empty chamber and which remains on the molding after the molding operation. Only after the molding has hardened is the undersleeve detached from it.

Finally, it is necessary to consider the instance where a layer element is introduced into the empty

chamber and is to be connected permanently to the concrete body to be produced, in order to form a composite body. The connection is obtained by means of a rough or specially bonding surface of the layer element on the side facing the concrete and/or by the use of suitable bonding agents. Examples of layer elements, which, in the instance of use, lie on the top side or on the visible side of the compsite body, are ceramic or clay elements, natural-stone slabs or the like.

The object on which the invention is based is to design a mold in such a way that even heavy moldings can be held in the mold and be raised together with the latter, and that the mold can automatically receive and retain insertion parts and layer elements before the concrete is introduced and, even after the molding operation, can raise and carry the insertion part, together with the concrete body or the composite body, so that the latter can be deposited on a base different from the production base (vibrating table).

In a mold of the type defined in the introduction, this object is achieved, according to the invention, by means of the characterizing features of Claim 1. The proposed clamping device increases the transverse force exerted on the particular part to be retained and thereby, within a specific time interval which is selectable, increases the friction on the chamber wall. Thus, concrete bodies produced in the empty chamber can be retained. In other cases, it is possible to slip the molding frame or the molding chambers over the part or parts to be received and then actuate the clamping device, so that these parts are then retained after the base has been removed from the mold.

Since molds of this type are used in production machines working automatically, it is essential that the clamping device should work automatically. It is therefore advantageous to actuate it by means of a pressure medium, the pressure of which can be controlled.

The particular difficulty in the construction of the clamping device is that molds of this type are

subjected to extremely harsh vibrating stress. Moreover, the thickness of the chamber walls is limited. In principle, the clamping device can contain flat tapered slide valves which are movable by means of a working cylinder and which are themselves connected operatively to a suitably designed clamping member. The return of the clamping members into the initial position could be carried out by means of springs or likewise hydraulically/pneumatically.

It is proposed, as a particularly simple and therefore preferred embodiment, that the chamber walls have on the inside a groove, into which an elastic hose loaded by the pressure medium is inserted. The groove extends preferably horizontally, that is to say parallel to the lower edge of the chamber wall. When the hose is put under pressure, it inflates and endeavors to swell beyond the groove. At the same time, it presses onto the part to be retained. A clamping device of this type can extend from chamber corner to chamber corner or also be shorter than the respective chamber wall. If the part to be retained is relatively light, a clamping device on one chamber wall may already be sufficient. However, clamping arrangements can also be mounted on two opposite or on all chamber walls.

For the last-mentioned instance, it is proposed that the hose or a plurality of hose portions be part of a closed ring conduit which extends over the entire chamber circumference and of which the connecting conduit coming from a pressure-control device is brought through a chamber wall. It is possible to use angular pipes at the corners and a pipe T-piece made of metal for the connecting conduit and to connect these pipes to straight flexible hose pieces. However, a ready-vulcanized annular hose can also be used. The advantage of this is that, in addition to its clamping effect, the annular hose also performs a sealing function and, all-round, prevents the penetration of concrete slurry into the gap between the chamber wall and the part to be retained.

Various alternatives are proposed for the

cross-section of the hose and of the groove. In order to assist the retraction of the hose in the pressureless state, it is expedient if the groove is narrowed towards groove orifices by means of bead-like projections of the groove side walls. However, the groove side walls can also intentionally be kept plane, so that the hose, likewise provided with plane flanks, can slide between them. In order to achieve a high bearing force, the hose can have, between the flanks, a plane pressure face. However, this can also be provided with sealing lips or flutes. In a development of this idea, it can be expedient to depart completely from the cross-section of a hose with an essentially uniform wall thickness and to form onto it a rectangular gripping and sealing strip of solid cross-section. It is proposed, furthermore, that the hose be retained at the rear, that is to say on the inside of the groove, so that it retracts completely into the groove as a result of its elasticity or by being subjected to a vacuum. This fixing of the hose in the groove can also be brought about by an appropriate design of the cross-section, for example by forming onto the hose at the rear a bead which snaps into a correspondingly designed receiving groove.

In order to protect the hose against abrasion and damage, it is proposed that a strip covering the hose be inserted as a clamping member into the groove. This strip can consist of a suitable plastic, but also of metal, and be connected to the hose by means of flat clips partially surrounding the hose or in another way.

Instead of a hose in the narrower sense, a wider expansion element, that is to say a cushion or a concertina loaded by the pressure medium, can also be provided, in which case such an expansion element could actuate a plate-like clamping member.

When layer elements consisting of a relatively brittle, that is to say impact-sensitive, or soft material are used, there is the risk that the edges of the layer element will be damaged by impact against the chamber wall during vibration. In order to counteract

this risk, it is proposed that a lower region of the inner face of the chamber wall which contains the clamping device be set back relative to the remaining inner face, for example by a few millimeters. The height of the set-back region should exceed a little the height of the layer element on its outer circumference.

In order to prevent the rebound contact mentioned, it is expedient if the chamber wall possesses, if appropriate in addition to the set-back of the inner face, above the clamping device a horizontally extending groove, into which is inserted an elastic impact-protection strip which is softer than the chamber wall, but nevertheless harder than the inflated clamping hose. Preferably, the impact-protection strip, which can have a rectangular or trapezoidal cross-section, is arranged directly below the shoulder which forms the transition between the inner face and the set-back inner-face portion of the chamber wall.

Exemplary embodiments of the invention are explained below by means of the drawing.

In particular, in this:

Figure 1 shows a diagrammatic representation in vertical section of a mold for a concrete curbstone,

Figure 2 shows, in a corresponding representation, a mold for a light well with a frame-like undersleeve of angular cross-section,

Figure 3 shows, in a corresponding representation, a mold for a concrete gutter with an undersleeve,

Figure 4 shows, in a corresponding representation, a mold for a gutter stone in the form of a composite body consisting of a gutter made of clay and of a lower concrete body,

Figure 5 shows a vertical section of the lower part of a chamber wall and of a composite slab produced in this

chamber, in approximately natural size,

Figures 6-9 show different versions of hose cross-sections, likewise on an approximately natural scale,

Figure 10 shows a multi-sectional top view of an annular hose, such as is used in the molding chamber according to Figure 5, on a smaller scale, and

Figure 11 shows a vertical section of the lower part of another chamber wall, the hose not being shown for the sake of clarity.

The diagrammatic representations of Figures 1 to 4 are intended to give examples of the use of the invention. Figure 1 shows a box mold with two mutually opposite longitudinal walls 1 and 2, which serves for the production of a curbstone 3 made of concrete. To simplify the diagram, the rear end wall is not shown. A ram 4, the so-called blade, indicated by dot-and-dashed lines engages into the mold from above. The oblique face 5 typical of these concrete bodies is obtained thereby. Without special measures, the freshly compacted molding would slip out of the mold while the latter was being raised. Consequently, there is formed on the inner faces of the chamber, in the lower region, a groove which extends all-round and which contains an elastic hose 6 connected to a pressure-medium source 9 via a connecting conduit 7 and a pressure-control device 8. This is shown in Figure 10. This hose is a frame-like hose having a connection piece which is made in one piece. When this hose, which encircles the curbstone 3, is put under pressure, it prevents the concrete body from falling out of the mold when the latter is lifted off from the vibrating table.

The mold according to Figure 2 serves for the production of a U-shaped light well 10 for cellar windows. The sectional plane extends transversely to the U-legs. The sectional diagram shows the two outer

transverse walls 11 and 12 and the two inner transverse walls 11' and 12' which form the legs of the light well 10. In order to provide a clearance at the inner edge of the light well 10 for the insertion of a grating, a U-shaped undersleeve 13 is inserted into the mold. It has an L-shaped cross-section, the vertical leg forming the said clearance. Located opposite this vertical leg, in the chamber walls 11' and 12', are grooves having inserted hoses 6' which could be connected by means of a groove and a hose piece in the longitudinal wall connecting these two transverse walls.

At the start of the molding operation, this mold is lowered over the undersleeve brought up by means of a conveying base and located exactly in position. The hose 6 is then put under pressure and the undersleeve is consequently clamped in the mold. The conveying base for the undersleeve can then be removed and the mold lowered onto the vibrating table. Even after the concrete has been introduced and compacted, the mold, together with the concrete and the undersleeve, can be deposited again on another conveying base. For removal from the mold, the internal pressure of the hose 6' is relaxed.

In the example according to Figure 3, a molding box, similar to that of Figure 1, with longitudinal walls 1 and 2 is provided. A concrete gutter 14 is produced in this. For forming the shape of the gutter, there is an undersleeve 15, on the top side of which the gutter shape is formed as a positive counterpart. Here too, the mold initially receives the undersleeve 15 and retains it by means of the pressurized hose. After the concrete has been introduced and compacted, the concrete and undersleeve are deposited on any base and removed from the mold. After the setting of the concrete, the undersleeve 15 is detached from the finished concrete gutter 14. The number of undersleeves present in a production plant usually corresponds to a daily production of corresponding concrete moldings.

In the example according to Figure 4, a mold approximately identical to that of the preceding example

serves for producing a water gutter as a composite body consisting of a lower concrete part 16 and of a gutter part 17 made of clay. Here, the gutter part 17 is received by the initially empty mold in the same way as the undersleeve 15 according to Figure 3. The essential difference from this preceding example is that, as a result of the stepped dovetail shape of its top side, the gutter part 17 bonds firmly with the concrete body. The composite body thus produced has a high stability as a result of its lower concrete part 16 and, on the side at the top in the installed state, offers a gutter made of the ceramic material desired here.

Figure 5 shows as a further example, in a representation true to scale, the relevant part of a mold for the production of a composite slab which consists of a natural-stone slab 18 and of a concrete layer 19. The natural-stone slab 18, on its bonding face at the top according to Figure 5, is naturally rough and, to increase the bonding strength, is provided where possible with clearances and is additionally coated with a bonding agent. Such composite slabs serve for the production of particularly attractive large-area ground coverings over which heavy vehicles can travel.

The molding chamber, in the upper region of its chamber wall 20 in which the ram runs and concrete is introduced, has a clear width which corresponds exactly to the width of the natural-stone slab 18. Starting a little above the natural-stone slab 18, the molding chamber widens via an oblique shoulder 21 and forms, with the side faces of the natural-stone slab 18, a gap 22 of a width of approximately 2.5 mm. The set-back plane surface portion 23 at the lower end of the chamber wall 20 merges at the bottom into the oblique face 24 which, should the molding frame and the natural-stone slab not be located in exactly corresponding positions, is intended to prevent them from being damaged during the lowering of the molding frame and to bring about a corresponding centering.

In the region of the set-back face portion 23,

the chamber wall 20 has an essentially rectangular groove 25, the upper side wall of which is approximately at the same height as the upper face of the natural-stone slab 18. The groove 25 is narrowed towards the orifice, that is to say towards the natural-stone slab 18, by means of two bead-like curved projections 26 on the groove side walls. Finally, the natural-stone slab 18 has a chamfer 27 at its upper edges. The natural-stone slab 18 is thus at a distance from the chamber wall 20 on all sides, so that it cannot be damaged during vibration. However, the width of the gap 22 uniform all-round is also important because the side faces of the supporting concrete layer 19 would have to form a common plane with the side faces of the natural-stone slab 18. This too is brought about by the hose 6 which can be loaded by means of air pressure. It seals off the gap 22 all-round and presses so firmly onto the side faces of the natural-stone slab 18 that the latter does not slip out downwards when the molding frame is lifted out, specifically not even when concrete has already been introduced into the molding chamber and compacted. In conclusion, during removal from the mold, the hose 6 ensures that the concrete slurry, which has penetrated into the recess between the shoulder 21 and the hose 6 during vibration, is pushed upwards and distributed so that the finished composite slab appears with smooth side walls. For this purpose, the air pressure in the hose 6 is reduced to such an extent that the hose can perform this function of a wiping lip. The result of the complete cancellation of the air pressure is that the hose 6 retracts completely into the groove 25 as a consequence of the beads 26.

Figure 7 shows another hose cross-section which is intended for a groove with plane side walls and which correspondingly possesses plane flanks 28 and a plane pressure face 29. Wedge-shaped sealing lips 30 are formed on the latter in the manner of a pressure-sensitive sucker.

The hose profile according to Figure 8 differs from the preceding one in a smaller oval cavity and in a

virtually rectangular solid profile portion which can also be designated as a formed-on gripping and sealing strip 31.

Figure 9, in addition to a further hose profile, also shows the associated groove shape. Essential here is a rear T-shaped profile extension 32 which engages into a corresponding shaped-out portion of the groove bottom and which thus retains the otherwise round hose in the groove which widens towards the groove orifice. When the hose is put under pressure, it fills the groove and reaches beyond the latter over a relatively large width, this being indicated by dot-and-dashed lines.

Figure 11 shows the design of a further chamber wall 32 in the relevant region. The hose groove 33 shown here has a slightly different cross sectional shape from that in Figure 5. It is rounded on the groove bottom. Above the hose groove 33 is provided a further rectangular groove which is parallel to the latter and into which is inserted an impact-protection strip 34 made of rubber or a suitable plastic. This groove is located at the point of transition between the upper portion and the lower set-back portion of the wall inner face. The natural-stone slab 35 used here has no chamfer at the transitional edge between its top face and its side face. The impact-protection strip 34 serves for protecting this edge during vibration and for the additional sealing off of the gap designated by 22 in Figure 5.

1 Longitudinal wall
2 Longitudinal wall
3 Curbstone
4 Ram
5 Oblique face
6 Hose
6' Hose
7 Connecting conduit
8 Pressure-control device
9 Pressure-medium source
10 Light well
11 Transverse wall (outer)
11' Transverse wall (inner)
12 Transverse wall (outer)
12' Transverse wall (inner)
13 Undersleeve
14 Concrete gutter
15 Undersleeve
16 Lower concrete part
17 Gutter part
18 Natural-stone slab
19 Concrete layer
20 Chamber wall
21 Shoulder
22 Gap
23 Face portion
24 Oblique face
25 Groove
26 Projections
27 Chamfer
28 Flank
29 Pressure face
30 Sealing lip
31 Gripping and sealing strip
32 Chamber wall
33 Hose groove
34 Impact-protection strip
35 Natural-stone slab

Patent claims:

1. Mold for concrete-block molding machines, with a molding frame having at least one chamber which is open at the top and bottom and which is bounded by chamber walls (1, 2; 11, 12, 11', 12'; 20; 32), characterized in that there is installed in at least one chamber wall (1, 2; 11, 12, 11', 12'; 20; 32) a clamping device which has a clamping member (6; 6'; 31) movable into the chamber essentially perpendicularly to the chamber wall.

2. Mold according to Claim 1, characterized in that the clamping device is actuable by means of a pressure medium, the pressure of which can be controlled (8).

3. Mold according to Claim 2, characterized in that the clamping device contains tapered slide valves which can be moved by means of a working cylinder and which are themselves connected operatively to the clamping member.

4. Mold according to Claim 2, characterized in that the chamber walls (1, 2; 11, 12, 11', 12'; 20; 32) have on the inside a groove (25; 33), into which an elastic hose (6; 6') loaded by the pressure medium is inserted.

5. Mold according to Claim 4, characterized in that the hose (6, 6') or a plurality of hose portions is or are part of a closed ring conduit (Figure 10), the connecting conduit (7) of which is brought through a chamber wall.

6. Mold according to Claim 4, characterized in that the groove (25) is narrowed towards the groove orifice by means of bead-like projections (26) of the groove side walls.

7. Mold according to Claim 4, characterized in that the hose has plane flanks (28) which can be laid against plane groove side-face portions.

8. Mold according to Claim 7, characterized in that the hose has a plane pressure face (29) extending between the flanks (28).

9. Mold according to Claim 4, characterized in that the hose has a pressure face (29) provided with sealing lips (30) or flutes.

10. Mold according to Claim 4, characterized in that a cross sectionally rectangular gripping and sealing strip (31) is formed onto the hose.

11. Mold according to Claim 4, characterized in that the hose is retained (32) at the rear, so that it retracts into the groove as a result of its elasticity or by being subjected to a vacuum.

12. Mold according to Claim 4, characterized in that a strip covering the hose is inserted as a clamping member into the groove.

13. Mold according to Claim 2, characterized in that the chamber wall has on the inside a shallow clearance, in which a cushion or a concertina loaded by the pressure medium is arranged.

14. Mold according to Claim 1, characterized in that a lower region (23) of the inner face of the chamber wall (20; 32) which contains the clamping device (6) is set back relative to the remaining inner face.

15. Mold according to Claim 1, characterized in that, above the clamping device, the chamber wall (32) has a horizontally extending groove, into which an elastic impact-protection strip (34) is inserted.

16. Mold according to Claim 15, characterized in that the impact-protection strip (34) is arranged directly below the shoulder which forms the transition between the inner face and the set-back inner-face portion of the chamber wall (32).

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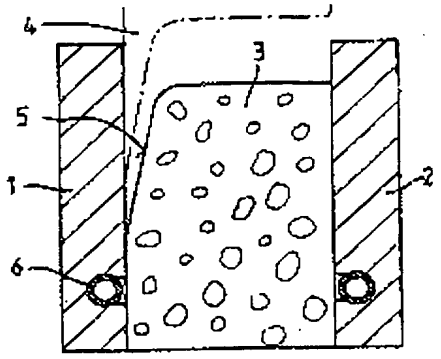

FIG. 1

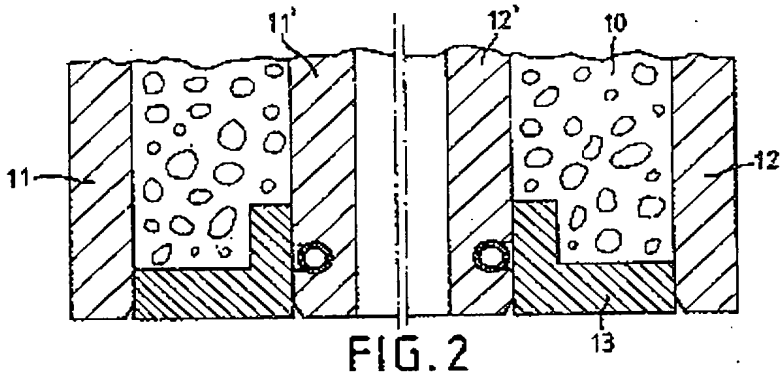

FIG. 2

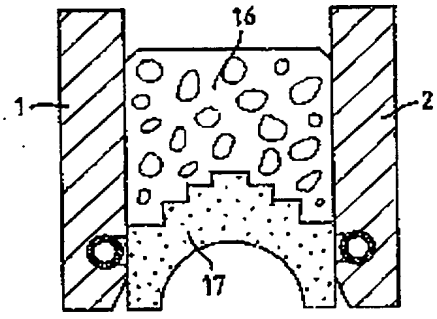

FIG. 4

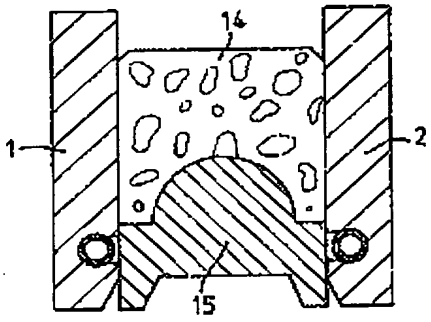

FIG. 3

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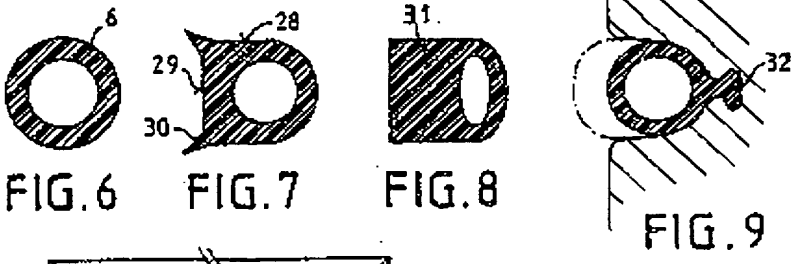

FIG.6 FIG.7 FIG.8 FIG.9

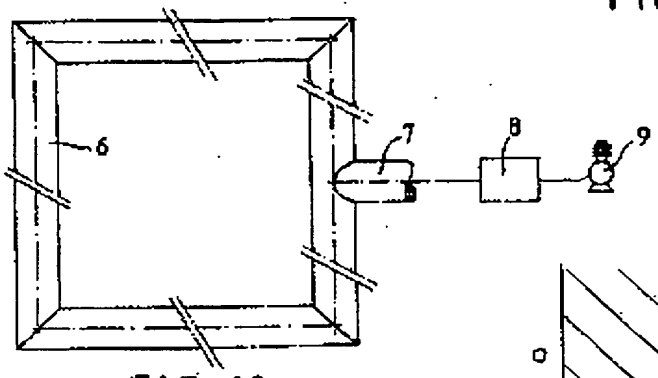

FIG.10

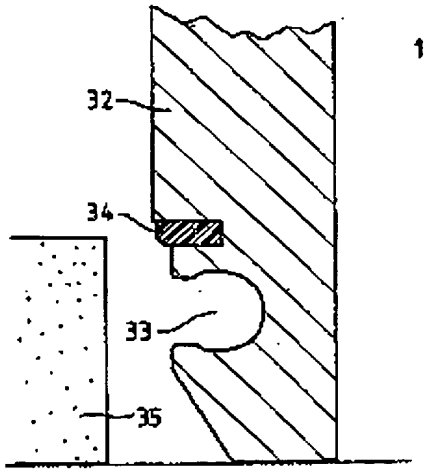

FIG.11

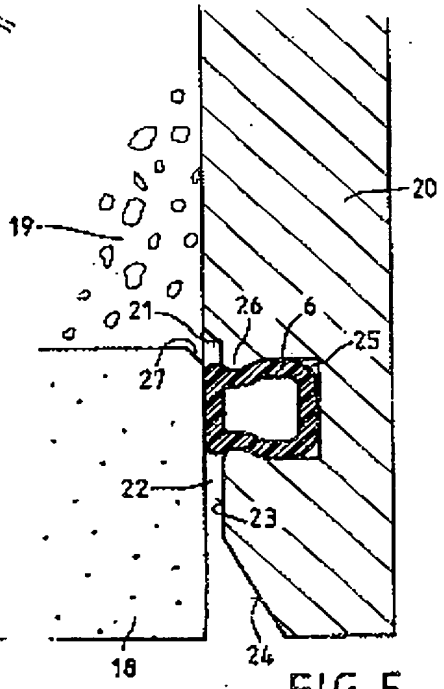

FIG.5

Abstract: 2111566

A mold for concrete-block molding machines is proposed. It comprises a molding frame having at least one chamber which is open at the top and bottom and which is bounded by chamber walls (1, 2). So that the molded concrete body (3), insertion parts or layer elements and, after the molding operation, the insertion part, together with the concrete body or the composite body, can be raised and carried in the mold, there is installed in at least one chamber wall a clamping device which has a clamping member movable into the chamber essentially perpendicularly to the chamber wall. There can be used, in particular, as a clamping device an elastic hose (6) which is loaded by a pressure medium and which is inserted into a groove formed on the inside of the chamber wall. The hose (6) is designed especially as a closed ring. The groove is narrowed towards the groove orifice by means of bead-like projections.

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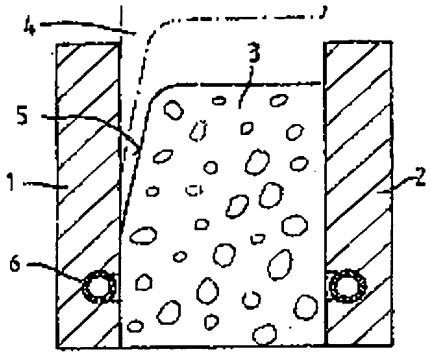

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